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ABSTRACT

This study investigated a dilemma faced by an experienced teacher during the early stages of participating in a mathematics instructional reform project, Quantitative Understanding Amplifying Student Achievement and Reasoning (QUASAR). The dilemma arose as the teacher's past practices came into conflict with new forms of instruction. Factors that assisted the teacher in dealing with the dilemma and arriving at a satisfactory resolution included: (1) encouraging teacher reflection on practice, (2) providing a nonthreatening forum for discussing reflections, and (3) providing ongoing support during implementation. (Author/MKR)

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ONE TEACHER'S STRUGGLE TO BALANCESTUDENTS' NEEDS FOR CHALLENGE AND SUCCESS

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This study investigates a dilemma faced by an experienced teacher during the early stages of participating in a mathematics instructional reform project. The dilemma arises as the teacher's past practices come into conflict with new forms of instruction. Factors that assisted the teacher in dealing with the dilemma and arriving at a satisfactory resolution are identified.

Dilemmas or conflicts in teaching are situations that arise when a teacher is confronted with two alternatives, which seem to stand in contradiction to each other, neither of which is considered a solution. Lampert (1985) suggests that dilemmas are commonplace in teaching and grow out of the uncertain and unpredictable nature of classroom activity. She recounts a dilemma from her own fifth-grade classroom where her practice of teaching from the "boys' side" of the room, so as to ensure that the boys' behavior did not get in the way of mathematics learning, created a conflict since the girls came to believe that they were being ignored. She was confronted with two alternatives—make the girls feel that they were being unfairly treated or risk misbehavior from the boys—neither of which she saw as a viable option.

Lampert argues that teachers need to be thought of as dilemma managers rather than problem solvers, recognizing that some situations cannot be solved and that facing dilemmas need not result in a forced choice between competing alternatives. According to Romagnano (1994), "the image of teachers as dilemma managers is one that gives teachers themselves opportunities for their own professional growth and development" (p.14). In the case of the "order vs. equal opportunity" dilemma noted above, Lampert made the decision to begin the next unit by reorganizing the class into four small groups (two of each gender) and moving one group of boys to what had been the "girls' side" and one group of girls to what had been the "boys' side". With each group working individually with the teacher or the student teacher, there was less of a chance that the teacher's behavior could be viewed as preferential towards one group. In addition, it allowed the teacher to respond to the students as individuals rather than as members of a gender group. This strategy allowed the teacher to manage the conflict without making a forced choice.

Lampert (1985) suggests that "our understanding of the work of teaching might be enhanced if we explored what teachers do when they choose to endure and make use of conflict" (p. 194). The Second Grade Mathematics Project (Wood, Cobb, & Yackel, 1991) provides a context for exploring Lampert's question. Wood et al. (1991) contend that it is through the resolution of conflicts or dilemmas that learning occurs. The second grade teacher, who was the focus of their research, encountered conflicts which challenged her previous assumptions about her role as the authority in the classroom (e.g., using teacher-given procedures vs. student-

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created procedures). Through reflection on her practice, work with students in her classroom, and support from researchers, she resolved the conflict and came to develop a form of practice that placed an emphasis on students as constructors of mathematical knowledge. Hence, the conflicts with which she dealt provided occasions for new learning and in turn led to the development of an enhanced instructional practice.

Ball (1993) contends that while dilemmas can occur under any conditions, they are even more likely to occur when teachers begin to implement reform. What teachers are trying to do stands in sharp contrast to what teachers have previously done. New ways and old practices that seem contradictory put the teacher in the position of having to accommodate new knowledge and previous beliefs and ways of doing and knowing. Potential conflicts are inherent as teachers make significant shifts in the types of mathematics tasks used, the nature of the classroom discourse, the learning environment, and the analysis of teaching and learning (NCTM, 1991).

If mathematics education reform is going to take hold on a large scale, we need to facilitate the process by "being able to recognize certain familiar dilemmas, crises, or choice points and understand something about the typical range of routes through those points" (Goldsmith & Schifter, 1993, p.12). Understanding the dilemmas faced by teachers in the early stages of reform, the process by which a teacher deals with or "works through" the dilemmas associated with reform, and the factors that contribute to teachers "hanging in there" rather than abandoning reform, have implications for in-service education, especially with respect to the experiences and support needed to make this transition.

The purpose of this study is to investigate an instructional dilemma with which a teacher struggled during the early stages of implementing mathematics education reform in her classroom. Of particular interest is the situation which gave rise to the dilemma, the way the teacher dealt with the dilemma, and the factors that support successful resolution of the dilemma.

Method

Subject

The subject of this study is Ellen Hyde, a veteran teacher with 25 years of experience, who was participating in QUASAR — a national project aimed at improving mathematics instruction for students attending middle schools in economically disadvantaged communities in ways that are consistent with the recommendations of the National Council of Teachers of Mathematics (1989, 1991).

Data

The data, gathered during the first three months of the 1990-91 school year, provide information on classroom instruction, staff development, and personal perspectives of the teacher. Specific data from this period include 37 journal entries written by the teacher; videotapes of three consecutive teaching episodes;

interviews conducted with the teacher before and after the sequence of teaching episodes; and videotapes of two-full day staff development sessions in which the teacher participated along with her mathematics teacher colleagues and teacher educators from a local university (i.e., "Resource Partners") who provided support during project implementation. The resource partners encouraged Ellen and her colleagues to keep journals of reflections on the issues or concerns regarding their practice that were most salient to them.

Analysis

All data were systematically reviewed, and the dilemmas with which the teacher struggled were identified. An area the teacher repeatedly identified as problematic was then traced chronologically through the data sources. The trace involved looking for ways in which the dilemma manifested itself in the teacher's oral and written accounts of her practice and in actual classroom instruction and for factors that appeared to influence the teacher's perspective regarding the dilemma.

Results

One dilemma that emerged early in the first year was the tension between structuring learning opportunities so that students could experience success and facilitating the development of problem-solving skills. While the teacher stated that one of her goals for the year was to help students approach problem solving openly, she also felt that if the students were given tasks which were too hard or too frustrating, students would become defeated by their failures. If that happened, she felt that she would not have fulfilled her obligation as a teacher. Thus, she structured her lessons so that students would experience success. As she commented in a journal entry early in the school year:

> I can't buy the idea that kids don't feel bad starting off with what they perceive to be failure. When they have homework they can't do or don't have the confidence to do then I have to intervene... I will help kids do more verbalization in class, get to the kids who didn't volunteer and guarantee them success by asking them to do things they couldn't fail to do right. I can't ignore that success breeds success. Too many are starting out with what I'm sure they perceive to be failure. [September 16, 1990]

In the classroom, this "structuring for success" often led the teacher to reduce a complex task to a set of subtasks which presented little challenge to students and provide limited insight into student thinking. The lessons became directive, guided by low-level questions that were, in Ellen's words, "not designed for deep thinking, just success." This pattern was evident in the videotape of the first day of the three-day observation. When given the pattern train shown in Figure 1, rather than providing students with time to investigate the pattern—building the next train in the sequence, predicting some future train, and making general observations

regarding the pattern — the teacher began by asking questions regarding each figure in the train, guiding students in their observations and eliminating any potential for struggle or discomfort. The teacher-student exchange regarding the first train is shown in Figure 1.

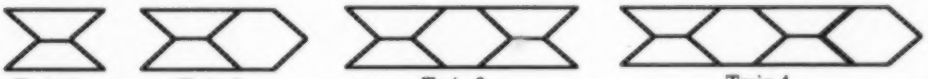

Figure 1.
Four Pattern Block Trains

T: Figure 1, Tim tell me one thing you and your partner noticed.

S: That there's 2 trapezoids and they're back to back and the small sides are back to back.

T: OK, would that be a pretty good description? He says "2 trapezoids back to back and the small sides are doing it." Anybody describe it differently, Mike?

S: A squished pop can.

T: And it looks like a squished pop can, all right. Keshia?

S: It has 4 equal sides.

T: The figure ends up having 4 equal sides there [pointing to the non-parallel sides of the two trapezoids]. And does it have another pair of equal sides?

S: Yes. And the outsides.

T: And the outsides.

S: Parallel sides.

T: The parallel sides are also equal. Right. Figure 2?

At a staff development session a few weeks later, teachers were given the opportunity to share a 10-minute segment of a videotaped lesson with their colleagues. Ellen volunteered to show a segment featuring the pattern block train shown in Figure 1. She indicated that she had discovered that her students weren't very good at observations, but that they had been verbalizing more since she broke it down for them, focusing their attention on each part of the sequence rather than on the entire series. One of the resource partners asked Ellen if the students had progressed to the point where they could make observations without "breaking it down." She asked Ellen how long you needed to break things down for students and questioned whether or not some of the observations would come out naturally if the students were given the opportunity to do so. Ellen went on to say that she hoped she did not always have to structure things, but that students were still at the

comfort stage, and they needed this support. She believed that once students experienced success they would try harder and that then it would no longer be necessary to provide this support.

In her journal later that day, Ellen reflected on the comments that had been made at the staff development session: "I need to make sure I'm not structuring too much. It is easy to be too leading and feel OK about it because the kids seem happy. After all, many kids are happy with shut up and add." Over time, she continued to question this approach, wondering whether structuring the learning opportunities so that students were always successful would help students to become competent and confident problem solvers. As she noted in her journal:

> I have decided that when an activity is easy, maybe just reinforcing or practicing, the room is quieter. It is when they are being challenged that they get scared. I'm going to watch and see if this is so. I'm so used to the idea that that kind of confusion means I haven't introduced the lesson properly or have given the kids something too hard. Sometimes that is true, but sometimes it is necessary to go through panic before we find solutions. [November 13, 1990]

Later that month, after watching the videotape of the pattern train lesson in it's entirety, and responding to a set of reflection questions provided by the resource partners, Ellen commented:

> Students had ample opportunity to successfully predict visual pattern block trains in this lesson, but it was set up too much for success and not enough for the frustration that goes with problem solving...I now think I need to let them go through the frustration that goes with problem solving. The lesson probably wouldn't have looked as smooth, but I think it would have stretched the kids more. I am at a different point in my thinking than I was at the time of the lessons. [November 26, 1990]

This view of the fall teaching episode stands in sharp contrast to her perspective on the day of the lesson: "The lesson was all I could have asked of the kids...it is very exciting."

The teacher struggled to develop a practice that would honor both her concern that students not feel the frustration of not having immediate success and her interest in having her students learn to engage and solve challenging problems. Through reflection on classroom practice (i.e., watching videotapes and journal writing) supported and encouraged by the resource partners, and interactions with others providing support (i.e., resource partners), Ellen began to change her perspective regarding the dilemma and to consider ways of supporting student learning without reducing the complexity of the tasks.

Discussion

The teacher in this study was confronted with issues that are at the heart of instructional reform — how to challenge students in ways that will empower them as learners of mathematics and provide sufficient support to meet the challenges without reducing the demands of the task. It has been well documented that complex mathematical tasks are often implemented in ways that reduce the cognitive demands of the task (Doyle, 1988; Stein, Grover, & Henningsen, in press). This 'reduction of cognitive demands' often is the direct result of pressure exerted by students resulting from their frustration with the task (e.g., Romagnano, 1994). Goldsmith and Schifter (1993) suggest that an important question for teachers is whether or not "they are able to find ways to encourage and support students as they struggle with the limitations of their current ways of knowing" (p.11). An important question for teacher educators is how to create experiences that will help teachers build this capacity.

This study suggests that encouraging teacher reflection on practice, providing a non-threatening forum for discussing reflections, and providing on-going support to teachers during implementation may be important factors in building a teacher's capacity to cope with instructional reform. While the need for reflection and support are promulgated by many reform-oriented teacher education projects, the current study provides insight regarding the links between support, reflection, and change. Longer-term studies are needed that look at teacher change over time, that provide additional insight into how dilemmas "play out" over an extended period, and that begin to specify how teacher learning occurs through the management and resolution of dilemmas.

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